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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/985,927 | 11/06/2001 | Naoki Shibata | P 280416 T36-140921M/KOH | 4555 |
| 21254 | 7590 | 01/04/2005 | EXAMINER SEFER, AHMED N | |
| MCGINN & GIBB, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817 | | | ART UNIT 2826 | |

DATE MAILED: 01/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/985,927

Applicant(s)

SHIBATA ET AL.

Examiner

A. Sefer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-19 and 23-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-19 and 23-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment filed October 31, 2004 has been entered. Claims 20-22 have been cancelled and new claims 28-32 have been introduced.
2. Claim 9 is objected to because of the following informalities: The recitation, "said surface" should read "a surface". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 24-27 and 32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification, as originally filed, fails to provide support for the limitation of "forming amorphous silicon portions" as recited in claim 24. Further more, the specification, as originally filed, fails to provide support for the limitation of "bottom of said plurality of openings being defined by said surface of said silicon substrate" as recited in claim 32. Without this information it would take undue experimentation to make and use the claimed invention.

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Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5-8 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa et al. ("Ogawa") USPN 6,420,283 in view of Takeuchi et al. ("Takeuchi") USPN 5,389,571.

Ogawa discloses (figs. 4 and 5 and col. 11, 46-50) a group III nitride compound semiconductor device comprising: a substrate 25 on a first environment division comprising a rounded shape 24 (as in claim 29) and a second environment division are formed; and a plurality of first group III nitride compound semiconductor layers 26 formed on said first environment division so as serve as effective semiconductor layers, wherein said first environment division comprises a surface of said substrate, said plurality of first group III nitride compound semiconductor layers being formed on said surface or directly on an exposed surface of said substrate (as in claim 6), and wherein said second environment division comprises silicon oxide 23 on said surface of said substrate, but lacks anticipation of a silicon substrate.

Takeuchi discloses (see fig. 2 and the paragraph bridging cols. 1 and 2) a group III nitride compound semiconductor device comprising: a silicon substrate 1 and plurality of first group III nitride compound semiconductor layers (polycrystal GaN) being formed on a surface of said silicon substrate or directly on an exposed surface of said substrate (as in claim 6).

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Since Ogawa and Takeuchi are both from the same field of endeavor, Group III nitride compound semiconductor device, the teachings disclosed by Takeuchi would have been recognized in the pertinent art of Ogawa. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Takeuchi teachings with Ogawa's device since employing silicon substrate satisfies most of the conditions for growing a group III nitride compound semiconductor layer as taught by Takeuchi.

Regarding claim 7, Ogawa discloses a plurality of first group III nitride compound semiconductor layers not being grown on said second environment division.

Regarding claim 8, Ogawa discloses in fig. 5 a second group 28 with different crystallinity from said group III nitride compound semiconductor layers grown on second environment division.

Regarding claim 28, Ogawa discloses a plurality of first group III nitride compound semiconductor layers formed only on said first environment division.

Regarding claim 30, Ogawa discloses a plurality of first group III nitride compound semiconductor layers comprising a plurality of stacks 26/27 of said first group III nitride compound semiconductor layers, each of which being individually and separately formed on said first environment division.

Regarding claim 31, Ogawa discloses (col. 10, lines 45-60) a thickness of said plurality of group III nitride compound semiconductor layers being less than a thickness of said separating layer.

7. Claims 9-11, 19, 23 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa in view of Takeuchi.

Ogawa discloses in figs. 4 and 5 a semiconductor device structure having a first portion and a plurality second portions, said structure comprising: a substrate 25; a silicon oxide 23 separating layer formed on said surface of said substrate and defining a plurality of openings 24 respectively formed on said surface in said plurality of second portions; and a plurality of stacks 26/27 of group III nitride compound layers which are respectively formed on said surface in said plurality of openings, but lacks anticipation of a silicon substrate.

Takeuchi discloses (see fig. 2 and the paragraph bridging cols. 1 and 2) a group III nitride compound semiconductor device comprising: a silicon substrate 1 and plurality of first group III nitride compound semiconductor layers (polycrystal GaN) being formed on a surface of said silicon substrate.

Since Ogawa and Takeuchi are both from the same field of endeavor, Group III nitride compound semiconductor device, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Takeuchi teachings with Ogawa's device since employing silicon substrate satisfies most of the conditions for growing a group III nitride compound semiconductor layer as taught by Takeuchi.

Regarding claims 10 and 11, Ogawa discloses (see fig. 4 and col. 11, lines 24-50) a plurality of openings comprising a square/rectangle having a side with a length within the range recited in the claim.

Regarding claim 19, Ogawa discloses a group III nitride compound semiconductor layers not being grown on said second separating layer.

Regarding claim 23, Ogawa discloses (see fig. 4 and col. 11, lines 24-50) a plurality of openings comprising a square/rectangle having rounded corners (col. 11, 46-50).

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Regarding claim 32, as understood, Takeuchi discloses in fig. 2B and 4C a bottom of plurality of openings (unnumbered) being defined by said silicon substrate.

8. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa in view of Takeuchi as applied to claim 9 above, and further in view of Sunakawa et al.

(“Sunakawa”) USPN 6,348,096.

The combined references disclose the device structure as recited in the claim, but do not specifically disclose an undercoat layer formed over said substrate in said plurality of openings.

Sunakawa discloses in figs. 4 and 5 a semiconductor device structure having a first and a plurality of second portions comprising an undercoat layer comprising one of metal (col. 27-31) formed over a substrate 11a and in a plurality of openings 34.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Sunakawa’s teachings since that would reduce the number of lattice defects as taught by Sunakawa.

Regarding claim 15, Sunakawa discloses each opening in said plurality of openings having a rounded shape.

As for the said separating layer or said distance of adjacent opening having certain dimensions recited in claims 12-13, the specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

9. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa in view of Takeuchi and Yuri et al. ("Yuri") USPN 6,168,659

Ogawa discloses in figs. 4 and 5 a method of forming a semiconductor device having first portion and a plurality of second portions, said method comprising forming a separating layer 23 over a surface of a substrate 25 or directly on said substrate (as in claim 18) etching said separating layer to create a plurality of opening in said separating layer; and forming a plurality of group III nitride compound semiconductor layers on said surface of said substrate in said plurality of openings, but does not specifically disclose a silicon substrate or forming a mask over said separating layer.

Takeuchi discloses (see fig. 2 and the paragraph bridging cols. 1 and 2) a group III nitride compound semiconductor device comprising: a silicon substrate 1 and plurality of first group III nitride compound semiconductor layers (polycrystal GaN) being formed on a surface of said silicon substrate.

Yuri discloses in figs. 7, 15 and 23 a method of forming a semiconductor device having first portion and a plurality of second portions, said method comprising forming a separating layer 2 over a substrate 7 or directly on said substrate (as in claim 18); forming a mask 6 over said separating layer or directly on said separating layer (as in claim 18).

Since Ogawa, Takeuchi and Yuri are all from the same field of endeavor, Group III nitride compound semiconductor device, the teachings disclosed by Takeuchi and Yuri would have been recognized in the pertinent art of Ogawa. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Takeuchi teachings with Ogawa's device since employing silicon substrate satisfies most of the conditions for growing a

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group III nitride compound semiconductor layer as taught by Takeuchi. It would have been obvious to form a mask over the separating layer so as to form accurate desired openings.

10. Claims 24-26, as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa in view of Yuri.

Ogawa discloses in figs. 4 and 5 a method of forming a group III nitride compound semiconductor device, said method comprising forming a group III nitride compound semiconductor layer 26 on a substrate surface having a different crystalline structure than portion designated by reference numeral 28.

Yuri discloses (see figs. 7, 15 and 23 and abstract) a method of forming a group III nitride compound semiconductor device, said method comprising forming amorphous portions by implanting ions in said substrate in a grid-shaped pattern.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate Yuri's teachings with Ogawa's device since that would provide gallium nitride thick film crystals excelling in crystallization as taught by Yuri.

As for claims 25 and 26, further limitations defined by these claims fail to further limit its method of making.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ANS
December 21, 2004